

Jared F. Miller

CONVEX OPTIMIZATION · NONLINEAR SYSTEMS · CONTROL

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Education

Northeastern University

Boston, MA, USA

PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2018 - May 2023

- Communications, Control, and Signal Processing (CCSP)
- Advised by Prof. Mario Sznaiar
- Thesis Title: “Safety Quantification for Nonlinear and Time-Delay Systems using Occupation Measures” [link]
- Thesis Committee: Octavia Camps, Didier Henrion (LAAS-CNRS), Bahram Shafai, Eduardo Sontag, Mario Sznaiar
- GPA: 4.0 (4.0 Scale)

M.S. IN ELECTRICAL AND COMPUTER ENGINEERING

Sept. 2015 - May 2018

- Communications, Control, and Signal Processing (CCSP)
- GPA: 3.852 (4.0 Scale)

B.S. IN ELECTRICAL ENGINEERING

Sept. 2013 - May 2018

- Minor in Mathematics
- GPA: 3.865 (4.0 Scale), Summa cum Laude

Research Publications

Journal Papers (published)

1. Jared Miller and Mario Sznaiar. Bounding the Distance to Unsafe Sets with Convex Optimization. *IEEE Transactions on Automatic Control*, 68(12):7575 – 7590, 2023. [link]
2. Jian Zheng, Tianyu Dai, Jared Miller, and Mario Sznaiar. Robust Data-Driven Safe Control using Density Functions. *IEEE Control Systems Letters*, 7:2611–2616, 2023. [link] (LCSS-CDC)
3. Jared Miller and Mario Sznaiar. Data-Driven Gain Scheduling Control of Linear Parameter-Varying Systems using Quadratic Matrix Inequalities. *IEEE Control Systems Letters*, 7:835–840, 2022. [link] (LCSS-ACC)
4. Jared Miller, Yang Zheng, Mario Sznaiar, and Antonis Papachristodoulou. Decomposed structured subsets for semidefinite and sum-of-squares optimization. *Automatica*, 137:110–125, 2022. [link]
5. J. Miller, D. Henrion, and M. Sznaiar. Peak Estimation Recovery and Safety Analysis. *IEEE Control Systems Letters*, 5(6):1982–1987, 2021. [link] (LCSS-ACC)
6. Jared Miller, Muhammad Ali Al-Radhawi, and Eduardo Daniel Sontag. Mediating Ribosomal Competition by Splitting Pools. *IEEE Control Systems Letters*, 5(5):1555–1560, 2021. [link] (LCSS-ACC)

Journal Papers (submitted)

1. Jared Miller, Matteo Tacchi, Mario Sznaiar, and Ashkan Jasour. Peak Value-at-Risk Estimation of Stochastic Processes using Occupation Measures. 2024. [link]
2. Jared Miller, Matteo Tacchi, Didier Henrion, and Mario Sznaiar. Unsafe Probabilities and Risk Contours for Stochastic Processes using Convex Optimization, 2024. [link]
3. Jared Miller and Mario Sznaiar. Peak Estimation of Hybrid Systems with Convex Optimization, 2023. [link]
4. Jared Miller, Tianyu Dai, and Mario Sznaiar. Data-Driven Stabilizing and Robust Control of Discrete-Time Linear Systems with Error in Variables, 2023. [link]

Conference Proceedings (published)

1. Jared Miller, Tianyu Dai, and Mario Sznaiar. Superstabilizing Control of Discrete-Time ARX Models under Error in Variables. *IFAC-PapersOnLine*, 56(2):2444–2449, 2023. 22nd IFAC World Congress (Finalist for IFAC Young Author Award)
2. Jared Miller and Mario Sznaiar. Bounding the Distance of Closest Approach to Unsafe Sets with Occupation Measures. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 5008–5013, 2022. [link]
3. Jared Miller, Tianyu Dai, and Mario Sznaiar. Data-Driven Superstabilizing Control of Error-in-Variables Discrete-Time Linear Systems. In *2022 61st IEEE Conference on Decision and Control (CDC)*, pages 4924–4929, 2022. [link] (Outstanding Student Paper Award)
4. Filip Bečanović, Jared Miller, Vincent Bonnet, Kosta Jovanović, and Samer Mohammed. Assessing the Quality of a Set of Basis Functions for Inverse Optimal Control via Projection onto Global Minimizers. In *2022 IEEE 61st Conference on Decision and Control (CDC)*, pages 7598–7605, 2022. [link]
5. Jared Miller and Mario Sznaiar. Facial Input Decompositions for Robust Peak Estimation under Polyhedral Uncertainty. *IFAC-PapersOnLine*, 55(25):55–60, 2022. [link] (IFAC Young Author Award)
6. Jared Miller, Didier Henrion, Mario Sznaiar, and Milan Korda. Peak Estimation for Uncertain and Switched Systems. In *2021 60th IEEE Conference on Decision and Control (CDC)*, pages 3222–3228, 2021. [link] (Outstanding Student Paper Award)
7. J. Miller, R. Singh, and M. Sznaiar. MIMO System Identification by Randomized Active-Set Methods. In *2020 59th IEEE Conference on Decision and Control (CDC)*, pages 2246–2251, 2020. [link]

Conference Proceedings (published)

9. Jared Miller, Yang Zheng, Mario Sznaier, and Antonis Papachristodoulou. Decomposed Structured Subsets for Semidefinite Optimization. In *2020 21st IFAC World Congress*, 2020. [link]
10. Chieh Wu, Jared Miller, Yale Chang, Mario Sznaier, and Jennifer Dy. Solving Interpretable Kernel Dimensionality Reduction. In H. Wallach, H. Larochelle, A. Beygelzimer, F. d'Alché-Buc, E. Fox, and R. Garnett, editors, *Advances in Neural Information Processing Systems*, volume 32, pages 7915–7925. Curran Associates, Inc., 2019. [link] (acceptance rate 21.9%)
11. J. Miller, Y. Zheng, B. Roig-Solvas, M. Sznaier, and A. Papachristodoulou. Chordal Decomposition in Rank Minimized Semidefinite Programs with Applications to Subspace Clustering. In *2019 IEEE 58th Conference on Decision and Control (CDC)*, pages 4916–4921, 2019. [link]
12. J. Miller and B. Shafai. A Model of Heave Dynamics for Bagged Air Cushioned Vehicles. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 976–981, 2019. [link]
13. B. Taskazan, J. Miller, U. Inyang-Udoh, O. Camps, and M. Sznaier. Domain Adaptation Based Fault Detection in Label Imbalanced Cyberphysical Systems. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 142–147, 2019. [link]

Conference Proceedings (accepted but not yet published)

1. Jared Miller, Jian Zheng, Mario Sznaier, and Chris Hixenbaugh. Data-Driven Superstabilization of Linear Systems under Quantization. In *2024 American Control Conference (ACC)*, 2024. [link]
2. Jared Miller, Matteo Tacchi, Mario Sznaier, and Ashkan Jasour. Peak Value-at-Risk Estimation for Stochastic Differential Equations using Occupation Measures. In *62nd IEEE Conference on Decision and Control*, 2023. [link]
3. Jared Miller, Tianyu Dai, Mario Sznaier, and Bahram Shafai. Data-Driven Control of Positive Linear Systems using Linear Programming. In *62nd IEEE Conference on Decision and Control*, 2023. [link]
4. Jared Miller, Milan Korda, Victor Magron, and Mario Sznaier. Peak Estimation of Time Delay Systems using Occupation Measures. In *62nd IEEE Conference on Decision and Control*, 2023. [link]

Conference Proceedings (submitted)

1. Mohamed Abdalmoaty, Jared Miller, Mingzhou Yin, and Roy S. Smith. Frequency-Domain Identification of Discrete-Time Systems using Sum-of-Rational Optimization, 2023. [link]
2. Jared Miller and Roy Smith. Peak Estimation of Rational Systems using Convex Optimization, 2023. [link]

Preprints

1. Jared Miller and Mario Sznaier. Quantifying the Safety of Trajectories using Peak-Minimizing Control, 2023. [link]
2. Jared Miller and Mario Sznaier. Analysis and Control of Input-Affine Dynamical Systems using Infinite-Dimensional Robust Counterparts, 2023. [link]

Seminars

1. “Data-Driven Safety Quantification using Robust Optimization,” October 18, 2023, Cybernetic Systems and Controls Lab (CSCL), Arizona State University, Tempe, AZ. [link]
2. “Risk analysis for stochastic processes using polynomial optimization,” October 15-18, 2023, Convex Relaxations for Polynomial Optimization, INFORMS Annual Meeting, Phoenix, AZ [link].
3. “Data-Driven Safety Quantification using Robust Optimization,” October 11, 2023, Safe Autonomy and Intelligent Distributed Systems (SAIDS) group, University of Southern California, Los Angeles, CA. [link]
4. “Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization,” July 27, 2023, Konstanz Real Algebraic Geometry Seminar, University of Konstanz. [link]
5. “Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization,” May 29, 2023, Student Seminar Series on Optimization, Control & Learning, UC San Diego. [link]
6. “Quantifying Safety under Uncertainty using Occupation Measures,” May 26, 2023, Control Seminars @ UCI, UC Irvine
7. “Data-Driven Safety Quantification using Infinite-Dimensional Robust Convex Optimization,” May 19, 2023, Multi-Robot Systems Lab Meeting, Stanford University. [link]
8. “Analysis and Control of Time-Delay Systems Using Polynomial Optimization,” May 14, 2023, MS14 Studying Dynamics using Polynomial Optimization Tools, SIAM Conference on Dynamical Systems. [link]
9. “Data-Driven Control under Input and Measurement Noise,” April 9, 2023, Oden Institute Seminar, UT Austin. [link]
10. “Safety Analysis for Nonlinear and Time-Delay Systems using Occupation Measures,” April 3, 2023, PhD Thesis Defense, Northeastern University. [link].
11. “Data-Driven Control under Input and Measurement Noise,” NYU MERIT Lab Seminar Series, New York City, Feb 21, 2023. [link]
12. “Bounding the Distance to Unsafe Sets with Convex Optimization”, DCSD Rising Stars, 2nd Modeling, Estimation and Control Conference, Jersey City, October 2-5 2022. [link]
13. Tutorials about Convexity, Interior Point Methods, Frank-Wolfe algorithms (with applications to system identification), and Polynomial Optimization, June 27, 2022, From Data to Control, Israeli Association of Automatic Control (with M. Sznaier). [link]
14. “Bounding distances to unsafe sets”, June 16, 2022, IfA Coffee Talks, ETH Zurich. [link]
15. “Bounding distances to unsafe sets”, June 14, 2022, LA3 Meeting, EPFL Lausanne. [link]
16. “Bounding distances to unsafe sets”, June 3, 2022, Journées SMAI MODE, University of Limoges (XLIM). [link]
17. Tutorials about Interior Point Methods, Polynomial Optimization, Frank-Wolfe algorithms and variations, and SDP approximations, May 16-20, Sparsity and Big Data in Control, Systems Identification, and Machine Learning, European Embedded Control Institute.
18. “Bounding distances to unsafe sets”, April 14, 2022, Conic Linear Optimization for Computer-Assisted Proofs, Mathematisches Forschungsinstitut Oberwolfach (MFO). [link]
19. “Bounding distances to unsafe sets”, June 28, 2021, Brainstorming days on measure and polynomial optimization (BrainPOP), LAAS-CNRS. [link]
20. “Data-Driven Peak and Reachability Set Estimation”, May 25, 2021, MS112 Methods of Learning Dynamical Systems for Control, SIAM Conference on Dynamical Systems. [link]

Seminars

21. "Analysis and Control of Time-Delay Systems with Occupation Measures", May 3, 2021, BrainPOP, LAAS-CNRS. [link]
22. "Exploiting Structure in Rank-Constrained and Approximated Semidefinite Programs", December 19, 2019, TISEM Operations Research Seminar, Tilburg University. [link]

Seminars (upcoming)

1. "Data-Driven Safety Quantification using Robust Optimization," February 16, 2024, Institute for Systems Theory and Automatic Control (IST), University of Stuttgart, Stuttgart, DE.
2. "Risk Analysis of Stochastic Processes using Auxiliary Functions," April 11, 2024, Laboratory of Signals and Systems (L2S), Paris-Saclay, FR.

Poster Sessions (without Conference Proceedings)

1. "Risk Analysis of Stochastic Processes using Polynomial Optimization." November 13, 2023, Future Trends in Polynomial Optimization, LAAS-CNRS, Toulouse, FR. [link]
2. "Frequency Domain Identification via Sum-of-Rational Optimization." September 25, 2023, European Research Network System Identification (ERNSI), Stockholm, SE. [link]
3. "Safety Analysis and Control using Measures." April 13, 2023, RISE 2023, Northeastern University. [link]
4. "Safety Analysis and Control using Measures." February 27, 2023, PhD Research Expo, Northeastern University. [link]
5. "Diameter Constrained Minimum Spanning Graphs." January 31, 2023, Current Themes of Discrete Optimization: Boot-camp for early-career researchers, ICERM. [link]
6. "Safety Analysis using Distance Estimation and Measures." August 24, 2022. CLEVR-AI MURI Yearly Review Meeting, Northeastern University. [link]
7. "Exploiting SDP Structure Yields Tighter Approximations." April 9, 2020. RISE, Northeastern University (remote). [link]
8. "Exploiting SDP Structure Yields Tighter Approximations." February 24, 2020. IPAM Control, Learning and Optimization workshop, University of California, Los Angeles. [link]
9. "Chordal Decompositions in Rank Minimized SDPs." May 30-31, 2019. Learning for Decision and Control (L4DC), Massachusetts Institute of Technology. [link]
10. "Chordal Decompositions in Rank Minimized SDPs." May 10, 2019. New England Machine Learning Day, Northeastern University. [link]
11. "Scattered data interpolation through B-spline wavelets and the Elastic Net." April 14, 2017. RISE, Northeastern University. [link]
12. "A parallelized Python-based Multi-Point Thomson Scattering analysis in NSTX-U." October 29, 2014. 56th Annual APS Plasma Physics Conference, New Orleans. [link]

Experience

ETH Zürich

POSTDOCTORAL RESEARCHER, AUTOMATIC CONTROL LAB (IFA), FORSCHUNGSGRUPPE PROF. ROY SMITH

Zürich, CH

August 2023 - Present

Northeastern University

POSTDOCTORAL RESEARCHER, ROBUST SYSTEMS LAB, CONTROLS GROUP

Boston, MA, USA

May 2023 - July 2023

Northeastern University

RESEARCH ASSISTANT, ROBUST SYSTEMS LAB, CONTROLS GROUP

Boston, MA, USA

Jul. 2017 - April 2023

Laboratory for Analysis and Architecture of Systems (LAAS-CNRS)

CHATEAUBRIAND FELLOW, DECISION AND OPTIMIZATION, METHODS AND ALGORITHMS IN CONTROL (MAC) TEAM

Toulouse, FR

Jan. 2022 - Jul. 2022

Paradigm Hyperloop

CONTROL THEORIST, LEVITATION GROUP

Boston, MA, USA

Jul. 2017 - Dec. 2017

ASML Holding

CO-OP, METROLOGY GROUP

Veldhoven, NL

Mar. 2016 - Aug. 2016

Advanced Micro Devices (AMD)

CO-OP, SHADER COMPILER GROUP

Boxborough, MA, USA

Jan. 2015 - Jun. 2015

Princeton Plasma Physics Laboratory (PPPL)

INTERN/PART-TIME CONTRACTOR, DATA VISUALIZATION GROUP

Plainsboro Township, NJ, USA

Sep. 2012 - Feb. 2016

Teaching

ETH Zürich

TEACHING ASSISTANT

- Convex Optimization & Robust Control

Zürich, CH

Spring 2024

TEACHING ASSISTANT

- System Identification (227-0689)

Fall 2023

Northeastern University

TEACHING ASSISTANT

- EECE 5644: Machine Learning and Pattern Recognition

Boston, MA, USA

Fall 2022

TEACHING ASSISTANT

- EECE 7345: Big Data, Sparsity, and Control

Fall 2021

European Embedded Control Institute

TEACHING ASSISTANT

- Sparsity and Big Data in Control, Systems Identification and Machine Learning

Toulouse, FR

May 16-20, 2022

Honors & Awards

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| Jul. 2023 | Finalist for Young Author Award , 2023 IFAC World Congress | Yokohama, JP |
| Jun. 2023 | Travel Award , 2023 American Control Conference (ACC) | San Diego, CA |
| Apr. 2023 | ECE Excellence in Research Award , Northeastern University College of Engineering | Boston, MA |
| Jan. 2023 | Travel Award , ICERM workshop: Current Themes of Discrete Optimization | Providence, RI |
| Dec. 2022 | Outstanding Student Paper Award , 2022 61st IEEE Conference on Decision and Control | Cancún, MX |
| Dec. 2022 | Travel Award , 2022 61st IEEE Conference on Decision and Control | Cancún, MX |
| Oct. 2022 | ASME DSCD Rising Star Award , MECC 2022 (IFAC) | Jersey City, NJ, USA |
| Sep. 2022 | IFAC Young Author Award , ROCOND 2022 (IFAC) | Kyoto, JP (remote) |
| Apr. 2022 | Travel Award , MFO: Conic Linear Optimization for Computer-Assisted Proofs | Oberwolfach, DE |
| Jan. 2022 | Travel Award (for Toulouse) , AFOSR FY22 International Student Exchange Program (ISEP) | Arvada, CO, USA |
| Dec. 2021 | Outstanding Student Paper Award , 2021 60th Conference on Decision and Control | Austin, TX, USA |
| Apr. 2020 | Chateaubriand Fellowship , Office of Science and Technology, Embassy of France in the USA | Toulouse, FR |
| Feb. 2020 | Hosting , IPAM: Intersections between Control, Learning and Optimization (UCLA Workshop) | LA, CA, USA |
| Dec. 2019 | Travel Award for Seminar , TISEM Seminar at Tilburg University | Tilburg, NL |
| Aug. 2019 | Travel Award , 2019 IEEE Conference on Control Technology and Applications (CCTA) | Hong Kong |
| 2013-2018 | Honors Program , Northeastern University | Boston, MA, USA |
| 2015-2018 | Dean's List , Northeastern University | Boston, MA, USA |

Skills

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|--------------------|---|
| Programming | Matlab (incl. Simulink), Python, Mathematica, LaTeX, Julia, C/C++ |
| MS Office | Word, Excel, PowerPoint, Publisher |

Professional Organizations

Institute of Electrical and Electronics Engineers (IEEE)

(MEMBER)

Sept. 2013 - Present

IEEE Eta Kappa Nu (HKN)

MEMBER, TUTOR

Sept. 2014 - Present

Society for Industrial and Applied Mathematics

MEMBER

Oct. 2019 - Present

IEEE CSS Technical Committee on Robust and Complex Systems (TC-RoCS)

MEMBER

Sept. 2022 - Present

IEEE CSS Technical Committee on Hybrid Systems

MEMBER

Jun. 2023 - Present

IFAC Technical Committee 2.5 Robust Control

MEMBER

Sept. 2022 - Present

INFORMS

MEMBER

June 2023 - Present

Professional Service

Reviewer

Automatica, IEEE Transactions on Automatic Control (TAC), IEEE Control Systems Letters (L-CSS), Learning for Dynamics & Control Conference (L4DC), IFAC Symposium on Robust Control Design (ROCOND), IEEE Conference on Decision and Control (CDC), European Control Conference (ECC), Nonlinear Analysis: Hybrid Systems, Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences; Kybernetika, Association for the Advancement of Artificial Intelligence (AAAI)